SAFETY DATA SHEET

1. IDENTIFICATION

Product Name: EBECRYL® 450 radiation curing resins
Synonyms: None
Product Description: Polyester acrylate resin
Molecular Formula: Mixture
Molecular Weight: Mixture
Intended/Recommended Use: Coatings & Inks

Allnex USA Inc., 9005 Westside Parkway, Alpharetta, Georgia 30009, USA
For Product and all Non-Emergency Information call your local Allnex contact point or contact us at http://www.allnex.com/contact

EMERGENCY PHONE (24 hours/day) - For emergency only involving spill, leak, fire, exposure or accident call:
Asia Pacific:
Australia: +61 2801 44558 (Carechem 24)
China (PRC): +86(0)532-8388-9090 (NRCC)
Japan: +81 345 789 341 (Carechem 24)
New Zealand: +64 9929 1483 (Carechem 24)
India: 000 800 100 7479 (toll free) or +65 3158 1198 (Carechem 24)
Korea: +82 2 3479 8401 (Carechem 24)
Malaysia: +60 3 6207 4347 (Carechem 24)
Philippines: +63 2 231 2149 (Carechem 24)
All Others: +65 3158 1074 (Carechem 24)
Europe/Africa/Middle East (Carechem 24):
Europe, Middle East, Africa, Israel: +44 (0) 1235 239 670
Middle East, Africa (Arabic speaking countries): +44 (0) 1235 239 671
Latin America:
Brazil: +55-800-707-7022 (toll free) or +55-11-98149-0850 (Suatrans 24)
Chile: +56 2 2582 9336 (Carechem 24)
Mexico and all others: +52-555-004-8763 (Carechem 24)
Canada and USA (Carechem 24 - Allnex29003-NCEC): +1-866-928-0789 (toll free) or +1-215-207-0061

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2. HAZARDS IDENTIFICATION

GHS Classification
Serious Eye Damage / Eye Irritation Hazard Category 1
Skin Sensitizer Hazard Category 1B
Aquatic Environment Acute Hazard Category 3
Aquatic Environment Chronic Hazard Category 3

LABEL ELEMENTS
Signal Word
DANGER

Hazard Statements
Causes serious eye damage
May cause an allergic skin reaction
Harmful to aquatic life with long lasting effects

Precautionary Statements
Wear protective gloves/protective clothing/eye protection/face protection.
Avoid breathing dust/fume/gas/mist/vapours/spray.
Contaminated work clothing should not be allowed out of the workplace.
Avoid release to the environment.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Immediately call a POISON CENTER or doctor/physician.
IF ON SKIN: Wash with plenty of soap and water.
Specific treatment (see supplemental first aid instructions on this label).
Wash contaminated clothing before reuse.
Dispose of contents/container in accordance with local and national regulations.

Hazards Not Otherwise Classified (HNOC), Other Hazards
Polymerization may occur from excessive heat, contamination or exposure to direct sunlight.

3. COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS

<table>
<thead>
<tr>
<th>Component / CAS No.</th>
<th>%</th>
<th>GHS Classification</th>
<th>Carcinogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complex reaction product consisting primarily of pentaerythritol triacrylate (CASRN 3524-68-3) and pentaerythritol tetraacrylate (CASRN 4986-89-4)</td>
<td>7 - 13</td>
<td>Acute Tox. 4 (H302) Skin Irrit. 2 (H315) Eye Dam. 1 (H318) Skin Sens. 1B (H317) Aquatic Acute 2 (H401) Aquatic Chronic 2 (H411)</td>
<td>-</td>
</tr>
<tr>
<td>Polyol acrylate</td>
<td>3 - 7</td>
<td>Skin Irrit. 3 (H316) Eye Irrit. 2A (H319) Skin Sens. 1B (H317)</td>
<td>-</td>
</tr>
<tr>
<td>Acrylated resin</td>
<td>70 - 85</td>
<td>Eye Irrit. 2A (H319)</td>
<td>-</td>
</tr>
</tbody>
</table>

The specific chemical identity and/or exact percentage of composition for one or more ingredients has been withheld as a trade secret.

Additional GHS classification or other information may be included in this section but has not been adopted by OSHA. See Section 16 for full text of H phrases.

4. FIRST AID MEASURES
First-aid Measures

**Inhalation:**
Remove to fresh air. If breathing is difficult, give oxygen. Apply artificial respiration if patient is not breathing. Obtain medical attention immediately.

**Skin Contact:**
Flush with a continuous flow of lukewarm water for 20 minutes or until material is removed. Wash with plenty of water and soap. Remove contaminated clothing and shoes without delay. Obtain medical attention if symptoms persist. Do not reuse contaminated clothing without laundering. Destroy or thoroughly clean shoes before reuse.

**Eye Contact:**
Rinse immediately with plenty of water for at least 30 minutes or until the chemical has been removed. Obtain medical attention immediately.

**Ingestion:**
If swallowed, call a physician immediately. Only induce vomiting at the instruction of a physician. Never give anything by mouth to an unconscious person.

Most Important Symptoms and Effects, Acute and Delayed
None known

Immediate Medical Attention and Special Treatment
In all cases of doubt, or when symptoms persist, seek medical attention. Never give anything by mouth to an unconscious person.

Notes To Physician:
No specific measures have been identified.

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5. FIRE-FIGHTING MEASURES

**Suitable Extinguishing Media:**
Use water spray or fog, carbon dioxide or dry chemical.

**Unsuitable Extinguishing Media:**
high pressure water jet.

**Protective Equipment:**
Firefighters, and others exposed, wear self-contained breathing apparatus. Wear full firefighting protective clothing. See MSDS Section 8 (Exposure Controls/Personal Protection).

**Special Hazards:**
Keep containers cool by spraying with water if exposed to fire.

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6. ACCIDENTAL RELEASE MEASURES

**Personal precautions:**
Where exposure level is not known, wear approved, positive pressure, self-contained respirator. Where exposure level is known, wear approved respirator suitable for level of exposure. In addition to the protective clothing/equipment in Section 8 (Exposure Controls/Personal Protection), wear impermeable boots.

**Methods For Cleaning Up:**
Cover spills with some inert absorbent material; sweep up and place in a waste disposal container. Flush spill area with water.

**Environmental Precautions:**
Avoid release to the environment.
7. HANDLING AND STORAGE

HANDLING

Precautions: Contaminated work clothing should not be allowed out of the workplace. Avoid release to the environment. Avoid breathing vapors or spray mist. Wear protective gloves and eye/face protection.

Special Handling Statements: Provide good ventilation of working area (local exhaust ventilation if necessary). Avoid excessive heat, contamination or exposure to direct sunlight to prevent polymerization.

STORAGE

Store in a cool, dry, well ventilated place and keep container tightly closed. Keep away from heat sources and direct sunlight.

Storage Temperature: Store at 4 - 40 °C 39.2 - 104 °F

Reason: Quality.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Measures:
Utilize a closed system process where feasible. Where this material is not used in a closed system, good enclosure and local exhaust ventilation should be provided to control exposure when spraying or curing at elevated temperatures.

Respiratory Protection:
For operations where inhalation exposure can occur use an approved respirator. Recommendations are listed below. Other protective respiratory equipment may be used based on user’s own risk assessment. Recommended respirators include those certified by NIOSH.

Recommended:
Full Face Mask with organic vapor cartridge, Type A filter (BP >65°C)

Eye Protection:
Prevent eye and skin contact. Provide eye wash fountain and safety shower in close proximity to points of potential exposure. Wear eye/face protection such as chemical splash proof goggles or face shield.

Skin Protection:
Prevent contamination of skin or clothing when removing protective equipment. Barrier creams may be used in conjunction with the gloves to provide additional skin protection. Wear impermeable gloves and suitable protective clothing.

Hand Protection:
Wear protective gloves. Recommendations are listed below. Other protective materials may be used based on user’s own risk assessment. Barrier creams may help to protect the exposed areas of the skin, they should however not be applied once exposure has occurred. Replace gloves immediately when torn or any change in appearance (dimension, color, flexibility etc.) is noticed.

Gloves for repeated or prolonged exposure - non exhaustive list:
Nitrile rubber (NBR), thickness: > 0.56 mm, break through time: up to 480 min

Gloves for short term exposure/splash protection - non exhaustive list:
Nitrile rubber (NBR), thickness: 0.1 mm, break through time: up to 30 min

The chemical resistance depends on the type of product and amount of product on the glove. Therefore gloves need to be changed when in contact with chemicals.
Not suitable gloves - non exhaustive list:
Latex gloves

Due to many conditions (e.g. temperature, abrasion) the practical usage of a chemical protective glove in practice may be much shorter than the permeation time determined through testing.

Additional Advice:
Food, beverages, and tobacco products should not be carried, stored, or consumed where this material is in use. Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water.

Exposure Limit(s)
No values have been established.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>dark amber</td>
</tr>
<tr>
<td>Appearance</td>
<td>liquid</td>
</tr>
<tr>
<td>Odor</td>
<td>acrylate</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>&gt; 100 °C</td>
</tr>
<tr>
<td>Melting Point</td>
<td>Not available</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>0.01 hPa @ 25 °C</td>
</tr>
<tr>
<td>Specific Gravity/Density</td>
<td>1.09 g/cm³</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>Not available</td>
</tr>
<tr>
<td>Percent Volatile (% by wt.)</td>
<td>&lt; 0.5</td>
</tr>
<tr>
<td>pH</td>
<td>Not available</td>
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<tr>
<td>Saturation In Air (% by Vol.)</td>
<td>Not available</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not available</td>
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<tr>
<td>Solubility In Water</td>
<td>slightly soluble</td>
</tr>
<tr>
<td>Volatile Organic Content</td>
<td>Not available</td>
</tr>
<tr>
<td>Flash Point</td>
<td>Non Flammable (polymerized at 176 °C)</td>
</tr>
<tr>
<td>Flammable Limits (% by Vol.)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>Not available</td>
</tr>
<tr>
<td>(n-octanol/water)</td>
<td></td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>Not available</td>
</tr>
<tr>
<td>Viscosity (Kinematic)</td>
<td>Not available</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Reactivity: No information available

Stability: Stable

Conditions To Avoid: Avoid direct exposure to sunlight. Avoid temperatures higher than 60°C. Avoid friction with temperature increase as result. Avoid exposure to strong UV sources. Loss of dissolved air. Loss of polymerization inhibitor. Avoid direct contact with heat sources. Protect from direct sunlight.

Polymerization: May occur

Conditions To Avoid: Uncontrolled polymerization may cause rapid evolution of heat and increase in pressure that could result in violent rupture of sealed storage vessels or containers. Hazardous polymerization can occur when exposed to direct sunlight. Hazardous exothermic polymerization can occur when heated.
Materials To Avoid: Avoid contact with peroxides. Avoid free radical producing initiators. Avoid contact with reactive metals. Contact with alkalis. They give an exothermic reaction with the product. Unintentional contact with them should be avoided.

Hazardous Decomposition Products: Carbon dioxide Carbon monoxide (CO)

11. TOXICOLOGICAL INFORMATION

PRODUCT TOXICITY INFORMATION

Likely Routes of Exposure: Skin, Eyes, Oral.

ACUTE TOXICITY DATA

<table>
<thead>
<tr>
<th>Route</th>
<th>Species</th>
<th>LD50</th>
<th>LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>oral</td>
<td>rat</td>
<td>&gt; 2000 mg/kg</td>
<td></td>
</tr>
<tr>
<td>dermal</td>
<td>rabbit</td>
<td>&gt; 2000 mg/kg</td>
<td></td>
</tr>
<tr>
<td>inhalation</td>
<td>rat</td>
<td>&gt; 5 mg/l (Dust/Mist)</td>
<td></td>
</tr>
</tbody>
</table>

LOCAL EFFECTS ON SKIN AND EYE

Acute Irritation
- dermal rabbit Not irritating (tested)
- eye rabbit Causes serious damage

ALLERGIC SENSITIZATION

| Sensitization | Skin | Respiratory | Sensitizing | No data |

GENOTOXICITY

Assays for Gene Mutations
- Ames Salmonella Assay No data

SPECIFIC TARGET ORGAN TOXICITY

Specific target organ toxicity (single exposure): No data
Specific target organ toxicity (repeated exposure): No data

OTHER INFORMATION

The toxicity data above are the results from Allnex sponsored studies or from the available public literature. The toxicological properties of this material have not been fully determined.

Prolonged or repeated contact with skin or mucous membrane may result in irritation symptoms such as redness, blistering, dermatitis, etc.

The inhalation of airborne droplets or aerosols may cause irritation of the respiratory tract.

HAZARDOUS INGREDIENT TOXICITY DATA

The complex reaction product consisting primarily of pentaerythritol triacrylate and pentaerythrytol tetraacrylate has acute oral (rat) and dermal (rabbit) LD50 values of 540-1350 mg/kg and 4600 mg/kg, respectively. This material may cause moderate skin irritation and severe eye irritation. Mixture of pentaerythritol triacrylate and pentaerythrytol tetraacrylate may cause skin sensitization. This material was not mutagenic in the Ames Salmonella Assay and not mutagenic in the mammalian forward gene mutation test (HPRT). The outcome for chromosomal damage in the mouse Micronucleus Assay was also negative. A prenatal study in rabbits has not shown any adverse effects with regard to developmental toxicity. Carcinogenicity has not been investigated.
Polyol acrylate has an acute oral (rat) and dermal toxicity (rabbit) LD50 values of >2000 mg/kg and >2000 mg/kg, respectively. Eye contact can cause serious corneal opacity, considerable redness and oedema. Skin irritation - no dermal reactions (OECD-PII= 0). This material may cause dermal sensitization. Mutagenicity: negative in the Ames test, positive in the mouse lymphoma gene mutation test. In vitro mammalian chromosome aberration test: negative.

The toxicological properties of acrylated resin have not been fully determined. Irritating to eyes. Slightly irritating to skin.

California Proposition 65 Warning (applicable in California only) - This product contains (a) chemical(s) known to the State of California to cause birth defects or other reproductive harm.

12. ECOLOGICAL INFORMATION

TOXICITY, PERSISTENCE AND DEGRADABILITY, BIOACCUMULATIVE POTENTIAL, MOBILITY IN SOIL, OTHER ADVERSE EFFECTS

Overall Environmental Toxicity: Harmful to aquatic life. Harmful to aquatic life with long lasting effects.

The ecological assessment for this material is based on an evaluation of its components.

RESULTS OF PBT AND vPvB ASSESSMENT

Not determined

HAZARDOUS INGREDIENT TOXICITY DATA

<table>
<thead>
<tr>
<th>Component / CAS No.</th>
<th>Toxicity to Algae</th>
<th>Toxicity to Fish</th>
<th>Toxicity to Water Flea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complex reaction product consisting primarily of pentaerythritol triacrylate (CASRN 3524-68-3) and pentaerythritol tetraacrylate (CASRN 4986-89-4)</td>
<td>ErL50 33 mg/l - Pseudokirchneriella subcapitata - 24-96 hr NOEC 12 mg/l - Pseudokirchneriella subcapitata - 24-96 hr</td>
<td>LC50 3.2 mg/l - Carp - 96 hr NOEC 2.2 mg/l - Carp - 96 hr</td>
<td>EC50 13 mg/l - water flea - 48 hr NOEC 10.3 mg/l - water flea - 48 hr</td>
</tr>
<tr>
<td>Polyol acrylate</td>
<td>Not available</td>
<td>Not available</td>
<td>Not available</td>
</tr>
<tr>
<td>Acrylated resin</td>
<td>Not available</td>
<td>Not available</td>
<td>Not available</td>
</tr>
</tbody>
</table>

13. DISPOSAL CONSIDERATIONS
The information on RCRA waste classification and disposal methodology provided below applies only to the product, as supplied. If the material has been altered or contaminated, or it has exceeded its recommended shelf life, the guidance may be inapplicable. Hazardous waste classification under federal regulations (40 CFR Part 261 et seq) is dependent upon whether a material is a RCRA "listed hazardous waste" or has any of the four RCRA "hazardous waste characteristics." Refer to 40 CFR Part 261.33 to determine if a given material to be disposed of is a RCRA "listed hazardous waste"; information contained in Section 15 of this MSDS is not intended to indicate if the product is a "listed hazardous waste." RCRA Hazardous Waste Characteristics: There are four characteristics defined in 40 CFR Section 261.21-61.24: Ignitability, Corrosivity, Reactivity, and Toxicity. To determine Ignitability, see Section 9 of this MSDS (flash point). For Corrosivity, see Sections 9 and 14 (pH and DOT corrosivity). For Reactivity, see Section 10 (incompatible materials). For Toxicity, see Section 3 (composition). Federal regulations are subject to change. State and local requirements, which may differ from or be more stringent than the federal regulations, may also apply to the classification of the material if it is to be disposed. The Company encourages the recycle, recovery and reuse of materials, where permitted, as an alternate to disposal as a waste. The Company recommends that organic materials classified as RCRA hazardous wastes be disposed of by thermal treatment or incineration at EPA approved facilities. The Company has provided the foregoing for information only; the person generating the waste is responsible for determining the waste classification and disposal method.

14. TRANSPORT INFORMATION

This section provides basic shipping classification information. Refer to appropriate transportation regulations for specific requirements.

US DOT
Dangerous Goods? Not applicable/Not regulated

TRANSPORT CANADA
Dangerous Goods? Not applicable/Not regulated

ICAO / IATA
Dangerous Goods? Not applicable/Not regulated

IMO
Dangerous Goods? Not applicable/Not regulated

SPECIAL PRECAUTIONS FOR USER
Protect against external heat sources above +40°C.

15. REGULATORY INFORMATION

Inventory Information

**United States (USA):** All components of this product are included on the TSCA Chemical Inventory or are not required to be listed on the TSCA Chemical Inventory.

**Canada:** All components of this product are included on the Domestic Substances List (DSL) or are not required to be listed on the DSL.
European Economic Area (including EU): When purchased from an Allnex legal entity based in the EEA (EU or Norway), this product is compliant with the registration of the REACH Regulation (EC) No. 1907/2006 as all its components are either excluded, exempt, pre-registered and/or registered.

Australia: All components of this product are included in the Australian Inventory of Chemical Substances (AICS) or are not required to be listed on AICS.

China: All components of this product are included on the Chinese inventory or are not required to be listed on the Chinese inventory.

Japan: All components of this product are included on the Japanese (ENCS) inventory or are not required to be listed on the Japanese inventory.

Korea: One or more components of this product are NOT included on the Korean (ECL) inventory.

Philippines: One or more components of this product are NOT included on the Philippine (PICCS) inventory.

Taiwan: All components of this product are included in the Taiwan chemical substance inventory or are not required to be listed on the Taiwan chemical substance inventory (TCSI).

Switzerland: All components of this product are exempt from the new substance notification requirements for Switzerland (SR 813.11 art. 24-26).

OTHER ENVIRONMENTAL INFORMATION
The following components of this product may be subject to reporting requirements pursuant to Section 313 of CERCLA (40 CFR 372), Section 12(b) of TSCA, or may be subject to release reporting requirements (40 CFR 307, 40 CFR 311, etc.) See Section 13 for information on waste classification and waste disposal of this product.

This product does not contain any components regulated under these sections of the EPA

PRODUCT HAZARD CLASSIFICATION UNDER SECTION 311 OF SARA

- Acute
- Reactivity

16. OTHER INFORMATION

NFPA Hazard Rating (National Fire Protection Association)
Health: 3 - Materials that, under emergency conditions, can cause serious or permanent injury.

Fire: 1 - Materials that must be preheated before ignition can occur.

Instability: 1 - Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures.

Reasons For Issue: New Logo

Date Prepared: 12/27/2016
Date of last significant revision: 06/24/2015

Component - Hazard Statements
Complex reaction product consisting primarily of pentaerythritol triacrylate (CASRN 3524-68-3) and pentaerythritol tetraacrylate (CASRN 4986-89-4)

H302 - Harmful if swallowed.
H315 - Causes skin irritation.
H317 - May cause an allergic skin reaction.
H318 - Causes serious eye damage.
H401 - Toxic to aquatic life.
H411 - Toxic to aquatic life with long lasting effects.

Polyol acrylate
H316 - Causes mild skin irritation.
H317 - May cause an allergic skin reaction.
H319 - Causes serious eye irritation.

Acrylated resin

H319 - Causes serious eye irritation.